REMARKS

This application has been amended. Specifically, claims 5 and 6 have been cancelled to overcome the objections raised with respect to these claims in the Office Action. No new matter has been added and claims 1, 3-4 and 7 are pending.

Claims 1 and 3-7 stand rejected under 35 U.S.C. 103(a) for obviousness over U.S. Patent Application Publication No. 2001/0016268 to Maki ("Maki '268") in view of U.S. Patent No. 5,789,089 to Maki ("Maki '089") and further in view of JP 2003-145278 to Iwase et al. For the following reasons, this rejection is respectfully traversed.

The present invention is directed to a steel/aluminum welded structure comprising a hot-dip Al-coated steel sheet having a coating layer, the coating layer consisting of, by mass, 3-12% Si, 0.5-5% Fe and the balance Al, except for inevitable impurities.

With respect to the coating layer, the Office Action contends that Maki '268 in combination with Maki '089 renders such a coating layer obvious. Maki '268, however, is directed to a plating layer having 2-13% Si and the balance Al, except for unavoidable impurities. (*See, e.g.,* Abstract, ¶¶ 20, 23, 26, 30) It thus appears that Maki '268 teaches a plating layer that consists exclusively of Al and Si (and unavoidable impurities). While the Office Action is correct that the plating bath described in Maki '268 contains Fe impurities supplied by plating apparatuses, Maki '268 does not mention that the actual plating layer contains any measurable Fe, much less between 0.5 and 5% Fe. Interestingly, Maki '268, in discussing the contents of the steel sheet, mentions weight percents as low as 0.0030%, and thus it is fair to assume the Fe content of the plating layer (if any) is considerably low if it is not even mentioned.

The Office Action then cites Maki '089 as allegedly teaching a hot-dipped Al coated steel sheet where the Al coating layer includes 2-15% Si and may also include about 0.2 to 0.8% Fe. Maki '089 further asserts that Fe adversely affects the corrosion resistance and the smaller the Fe amount, the better. (col. 7, lines 57-67)

The Office Action contends it would have been obvious to apply the teaching of Maki '089 to the invention of Maki '268 and limit the Fe content in the coating to less than 1.2% in order to maintain the corrosion resistance in the coating. However, Applicants

disagree that this is a fair application of the teaching of Maki '089 to Maki '268. As mentioned above, Maki '268 appears to disclose a coating layer completely (or essentially) void of any Fe. Moreover, an accurate summary of the teaching of Maki '089 is that Fe, in any amount, detrimentally affects corrosion resistance and should be limited whenever possible. How, exactly, the teachings of Maki '089 would motivate one skilled in the art to adjust the Fe content of the coating layer in Maki '268 from the disclosed level of between zero and "impurity" to less than 1.2% (but more than 0.5%) is unclear. Further, assuming that a small Fe content in the Maki '268 plating bath inherently leads to an Fe content in the coating layer of between 0.5 and 1.2% is entirely speculative and appears contrary to the disclosure of Maki '268 which recites a coating layer limited to Al, Si and impurities. "To establish inherency, the extrinsic evidence 'must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.'" *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted); *see also* M.P.E.P. § 2112.

Moreover, while both Maki documents appear to guard against the inclusion of <u>any</u> Fe in the coating layer, Applicants have provided a compelling reason for including Fe in amounts within the recited range. As explained in pages 4-5 of the subject application, The Al-Fe binary alloy layer likely originates from dissolution of Fe in molten Al. The dissolution rate of Fe depends on the Fe concentration gradient between the steel substrate and the coating layer. The behavior of Fe predicts that an increase of Fe concentration in the coating layer advantageously suppresses dissolution of Fe from the steel substrate into the molten Al. When steel sheets having a coating layer containing 0.5% or more Fe are spot-welded to aluminum sheets, Al-Fe binary alloy layers form at the center of the weld nuggets but unalloyed regions are detected at the periphery of the weld (where the heat input is less). An increase in Fe concentration is suitable for formation of the unalloyed region. However, excess Fe (i.e. over 5%) is unfavorable due to its harmful effects on other properties, like corrosion resistance. Thus, while Applicants (consistent with the Maki documents) understand that excessive Fe is unfavorable, it is also understood (inconsistent with the Maki documents) that a statistically significant amount of Fe is <u>favorable</u> in order to control formation of the Fe-Al alloy layer during spot welding of the Al sheet to the Al-coated steel

sheet. This realization is simply not taught or suggested in the Maki documents, which are completely void of any rationale for providing between 0.5 and 5% Fe in the coating layer applied to the steel sheet. Therefore, Maki '268 in combination with Maki '089 does not teach or suggest a coating layer containing between 0.5-5% Fe, by mass.

Furthermore, the steel/aluminum structure of the present invention has an area ratio of an Al-Fe binary alloy layer to the whole Al/Fe joint boundary of 90% or less. The Office Action contends that this limitation would be inherently met by spot welding an aluminum sheet to the Al-coated steel sheet of Maki '268 since the Maki '268 has the same materials and aluminum coating composition. Applicants note that the assertion that Maki '268 teaches the same materials and aluminum coating composition containing Si and Fe as the present claims is incorrect and unsupported. Summarizing from above, Maki '268, whether considered alone or in combination with Maki '089, simply fails to teach, disclose or suggest an Al-coated steel sheet having a coating layer consisting of, by mass, 3-12% Si, 0.5-5% Fe and the balance Al except for inevitable impurities. These Maki documents instead teach away from any Fe and, to the extent this is impossible, Maki '268 arguably implies that Fe can be present in the coating layer as an insignificant impurity. With reference to Table 1 in the subject application, a coating layer having an Fe amount such as 0.2 or 0.3%, by mass, would not result in the claimed joint boundary area ratio, irrespective of the amount of Si. There is nothing in Maki '268 to suggest that the area ratio of an Al-Fe binary alloy layer to the whole Al/Fe joint boundary would be 90% or less. Thus, again, the Office Action has impermissibly extended the teachings of the cited art so as to read on the subject claims absent an adequate disclosure or teaching to support the rejection. Therefore, a *prima facie* case of obviousness has not been established and the outstanding rejections should be reconsidered and withdrawn.

CONCLUSION

For all the foregoing reasons, Applicants submit that the pending claims are patentable over the cited documents of record and are in condition for allowance. Accordingly, reconsideration of the outstanding rejections and allowance of pending claims 1, 3, 4 and 7 are respectfully requested.

Respectfully submitted,

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